

AMATEUR SATELLITE REPORT

AMSAT's Newsletter for the Amateur Space Program.



Amateur Satellite Report is endorsed by the
American Radio Relay League as the special interest
Newsletter serving the Amateur Radio Satellite Community

Number 81
July 2, 1984

Editor: Vern Riportella, WA2LQQ
Contr. Editor: George Johnson, W0MD
Harold Winard, KB2M

Managing Editor: Bob Myers, W1XT

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NASA Chooses AMSAT's WA4SIR For Shuttle Science Mission

Apparently the Hams-In-Space theme will have periodic reprise throughout the second third of the decade as NASA has selected Dr. Ron Parise, WA4SIR, to fly as Payload Specialist on at least 2 future shuttle missions!

Ron was notified on 11 June 84 of his selection. In an exclusive interview with ASR last week, Ron indicated he had applied for the position in Sept. 83 and was delighted at his success. He is anxious to include Amateur Radio activities in the mission although he cautions, "This will be a crew-intensive mission" referring to the projected March 1986 planned launch of Mission 61F. The 61F mission will be a further flight of the Spacelab series.

Dr. Parise is an astronomer with a PhD from the University of Florida (1979) and is 33 years old. He has been a licensed amateur since he was 11 having held prior calls WN8JBR and WA8MHD. Ron is a native of Warren, Ohio, is married and has a young son. He and his wife, Cecelia, are expecting another child.

The newest astronaut-selection is employed by Computer Sciences Corporation in their Systems Sciences Division and currently lives in Silver Spring, Maryland not far from AMSAT Headquarters. Ron is an active AMSAT member and frequently gives talks and presentations on science aspects of OSCAR. He has been AMSAT's Science Coordinator for the UO-9 mission. Computer Sciences is under contract to NASA and in fact Ron works at the Goddard Space Flight Center at Greenbelt, Maryland.

Ron indicates his contract with NASA calls for him to fly at least two missions and to be backup for a third.

The first flight opportunity for Ron will be the 61F mission currently slated for Mar. 86. This mission will include the ASTRO 1 experiment sponsored by the NASA Office of Space Sciences and involves observation with three separate, specially designed ultraviolet (uv) telescopes.

Ron helped design the Ritchie-Chretien uv telescope which may provide a glimpse of Halley's comet which will be in the vicinity at the time. A second instrument has been built by Johns Hopkins University and is aptly called the Hopkins Ultraviolet Telescope or simply HUT. It is a prime focus spectrometer. The third instrument is the Wisconsin Ultraviolet Photo Polarimeter or WUPPE for short. The WUPPE is a classic Cassegrain design optimized for uv work.

Ron will operate the telescopes, help point them and oversee experimental data collection. Follow-on missions for Ron and the telescopes could include ASTRO 2 (Nov. 86) and ASTRO 3 (July 87).

Regarding his operating Amateur Radio from the shuttle Ron says he is "enthusiastic" and looks forward "to bringing some radios aboard". Ron says he will support proposals to NASA for Amateur Radio activity on the missions he will be flying but because of intense preparations for the science aspects of the mission, will be unable to spearhead the proposal effort. He indicated full support for the premise without hesitation, however.

The Amateur Space program has its roots firmly planted in space science. AMSAT is a remarkable alloy of scientists, engineers, educators and layman reflecting the very best in Amateur Radio. We are justly proud that "one of our own" has been selected to carry space science further along new paths and will be carrying Amateur Radio along just to keep in touch! Congratulations to Ron, WA4SIR! (And to us, too.)

Dr. Troy England, W0ORE, is due to fly the shuttle in March 85 and an ambitious proposal was jointly submitted by ARRL/AMSAT recently to permit Tony to follow the lead of Owen Garriott, W5LFL, and Owen's historic 1983 premiere Ham-In-Space effort.

Greenland DXpedition Planned For AO-10

Members of a scientific expedition to a mountainous area of Greenland will be active on AMSAT-OSCAR 10 from July 25 to August 20, 1984. Mauro, IK0CAK, will be part of a team travelling to Stauning Alps, Scoresby Land at 72 degrees N, 25 degrees W. Operating under the call IK0CAK/OX, Mauro will be using a 10-turn helix for the 435-MHz uplink and a pair of 10-element crossed Yagis to receive the 2-meter downlink. The station, which will generate 30 W at 435-MHz, will be powered by an array of solar cells.

The most useful orbits for North American stations will be 843, 847, 851, 855, 884, and 886. Those in Europe should listen during orbits 859, 861, 863, 867, and 871. In the Far East, Mauro should be available during orbits 834,

836, 838, 873, 877. Receive frequencies will be around 145.87 MHz for cw and 145.91 MHz for phone contacts. Operation will be approximately 4 hours around apogee. For confirmation, QSL cards should be sent to IØJAJ.

The expedition, called "Stauning 84," is part of a scientific research program to study the ionosphere at high latitudes. Indeed, some impairment of satellite operation is expected due to auroral scattering and listener reports on the effects of auroral reflections on the uplink signal are requested.

In addition to satellite operation, the expedition will operate an hf station from 2200 to 0600 UTC. Frequencies to watch for cw operation are 1840, 3510, 7005, 14025, 21025, and 28,025 kHz. Phone operation will be on 3785, 7070, 14195, 21220, and 28,550 kHz. The hf station will run 100 W and use wire antennas.

Tapes Available At Library Says WBØGAI

Roger Johnson, WBØGAI, tells ASR that numerous tapes are available through the AMSAT Video Tape Library which he administers for AMSAT. The available tapes are as follows:

#1 OSCAR, the Satellite You Can Use — A narrated slide program outlining the history of amateur satellites. Also includes a silent film of the attempt to launch Phase III-A. Available in VHS and Beta II.

#2 KA9Q Orbital Simulation Tape — A Computer simulation of the earth as it would appear from OSCAR 10. Simulation runs 60 seconds only. VHS only.

#3 Amateur Radio's Newest Frontier — The original ARRL tape of the W5LFL STS-9 flight in December 1983. VHS only. [Following tapes were originated at the 1983 AMSAT Annual Meeting/Space Symposium]

#4 OSCAR 10, its design technology and construction, W3GEY and the Mode L transponder, W3GEY. Runs 1:49. VHS only.

#5 OSCAR 10 operations and ground tracking requirements by KO5I. Map-based tracking systems by K2UBC. Personal



Karen Henderson, KB6DDQ, at her home in Camarillo, CA recently QSO'd through AO-10 using OM's (N6JFD) gateway station.



Mike Henderson, N6JFD, operated gateway station for historic first HT-to-HT QSO via AO-10.

computer-based orbital predictions and tracking programs by N5AHD. Runs 1:42. VHS only.

#6 Independent Space Project Committee by Ron Molz. Solar Sail Project by K8OCL. Amateur Space Telescope by Jesse Eichenlaub. Amateur satellite programs worldwide by W3IWI. Runs 2:03. VHS only.

#7 Packet Communications: PACSAT, UoSAT B. Circularly polarized antennas by K2UBC. Runs 1:49. VHS only.

#8 Analysis of engineering problems facing AO-10 by KA9Q. Spacecraft technology status; panel discussion by W3GEY, W4PUJ and KA9Q. Runs 2:00. VHS only.

All tapes are available for a non-refundable fee of \$6.00. Please also send a SEPARATE check for \$25.00 per tape in U.S. funds. The second check will be returned when the tape borrowed is received at the library. Tapes may be retained by the borrower for up to 3 weeks from the time of receipt. Correspondence may be addressed to: AMSAT Video Tape Library, 1627 36th Avenue Court, Greeley, CO 80634.

Call For Papers

AMSAT officials have announced that the AMSAT Annual General Meeting will be held in Los Angeles this year. The exact date remains to be decided but it appears late October or early November are prime candidate times. The Second Annual AMSAT Space Symposium will be held in conjunction with the meeting. AMSAT has issued a call for papers to be presented at the Space Symposium. Cleyon Yowell, AD6P, has been named Symposium Technical Chairman and inquiries should be directly to him. Dennis Dinga, N6DD, has volunteered to handle logistics for the meeting and Symposium.

Space Hardware On Display In Finland

Visitors to the Space 2000 exhibition in Finland this summer will get a first-hand look at Soviet space hardware. The exhibition at the Dipoli Conference and Congress Center near Helsinki will feature the 32-m long Salyut-Soyus-



Don Knollinger, WB8ZTV, AO-10 gateway station in Moundsville, WV.

Progress space station. In addition, there will be more than 30 exhibits related to the conquest of space showing sputniks, space capsules, and a variety of scientific and communications satellites.

The exhibition will be open from July 6 until August 5 from 10 A.M. until 8 P.M. The patron of the show is Mauno Koivisto, the president of Finland.

UO-11 Progress Report

UoSAT Bulletin-80 22nd June 1984

UoSAT-OSCAR 11 Status

Work continues apace to continue the investigations into the initial problems with OSCAR-11, to commission other parts of the spacecraft and to start commutated attitude control manoeuvres.

Major milestones achieved last week included the successful re-powering of the 1802 main computer, the use of the programmable dwell features of the telemetry system and the transmission of a number of new data formats which will be used to help the commissioning procedure.

The past week has been spent actively magnetorquing. The transverse spin (period initially around 40 seconds when the beacon was switched back on in May) has now been reduced to zero and work is currently being done to remove the oscillations which remain. The magnetorquer has been left on continuously since the spin nearly stopped, locking the z-axis of the spacecraft onto the Earth's magnetic field in a similar way to the permanent magnet used on OSCARs 7 and 8. The manual magnetorquing referred to below is performed using computers on the ground to compute the spacecraft's attitude from the dwell telemetry received and to pulse the magnetorquers by remote command. This process is being automated for the final damping, with a program due to run on the 1802 computer on-board the spacecraft.

A daily account follows:

Saturday 16/6/84

Transverse spin 82 seconds.

Sunday 17/6/84

Manual magnetorquing morning and evening. Spin 110 seconds.

Monday 18/6/84

Manual magnetorquing morning and evening. Spin 180 seconds.

Tuesday 19/6/84

Manual magnetorquing morning and evening. Spin about 600 seconds.

Wednesday 20/6/84

Manual magnetorquing during the morning, culminating in the z-magnetorquer coil being left permanently on at the end of orbit 1617. On orbit 1622, a whole-orbit telemetry program was loaded at 19:43:29, recording channels 1,2,3,10,50,52. This showed on the next pass that the spacecraft was locked to the magnetic field, but oscillating widely around it.

Thursday 21/6/84

Magnetorquing to damp the oscillations mentioned above was performed during the morning, followed by the loading of the whole-orbit telemetry program again. Load time was 10:55:27 and channels recorded were 0,2,10,20,30,52. The battery charging and power budget at this attitude was monitored, but not deemed to be too low. The ODATA program was loaded again at 18:43:56 and again on orbit 1637 (no time available), both using the same recorded channels.

Friday 22/6/84

More manual magnetorquing further damped the oscillating motion. This was followed by another ODATA to evaluate the effect. The load time was 11:27:17 and channels recorded were 1,2,3,10,50,52.

OSCAR-11 Attitude

Preliminary attitude control manoeuvres commenced on orbit 1535, 14th June, to reduce the transverse spacecraft spin and to nudge the z-axis up into the orbit plane ready for magnetic capture and subsequent gravity gradient boom deployment. The manoeuvres thus far have comprised commutated firings of the z-axis magnetorquer under on-board computer control initiated by ground command from real-time analysis of the spacecraft motion.

These manoeuvres will continue until the control algorithms have been verified, the magnetorquer effects calibrated and, hopefully, the spacecraft spin reduced. OSCAR-11 is transmitting a selected number of telemetry channels to provide rapid sampling of navigation data and magnetorquer status. Using the dwell telemetry, channels 01, 02, 03 and 61 are transmitted in a one-line frame with the standard checksum, thus providing very fast data for ground analysis.

UoSAT-OSCAR 11 Operations Schedule

Further transmissions of whole-orbit-telemetry data are likely next week to assess the performance of spacecraft systems and the results of attitude manoeuvres. Magnetorquing data and diagnostics from automated procedures can also be expected. Various tones and transmissions of random characters indicate uplink tests and other esoteric activities!

OSCARs 9 and 11 Whole Orbit Recorded Telemetry

The following is an extract from UoSAT bulletin no. 27, describing an 1802 computer program which can be run on OSCAR 9 to collect telemetry data over the period of one or more orbits and repeatedly dump the stored information back to the ground.

DETAILS OF THE WHOLE-ORBIT TELEMETRY RECORDING PROGRAM ARE GIVEN BELOW. THIS PROGRAM CAN STORE UP TO 7 CHANNELS OF TELEMETRY FROM EACH FRAME OVER A PERIOD OF UP TO 100 MINUTES (OR 1 CHANNEL FOR APPROX. 700 MINUTES) FOR LATER TRANSMISSION. PLOTS OF THE TELEMETRY CHANNELS RECORDED BY THE SPACECRAFT THROUGHOUT A WHOLE ORBIT (INCLUDING ECLIPSE, ETC) ARE USEFUL INDICATORS TO THE CONDITION OF THE VARIOUS INTERNAL SYSTEMS. THE PROGRAM PRODUCES CHECKSUMMED LINES OF DATA, WITH SERIAL NUMBERS AND A VARIABLE NUMBER OF TELEMETRY DATA VALUES. EACH LINE HAS BEEN RECORDED FROM THE STANDARD TELEMETRY FRAME (5.28 SECONDS DURATION, EACH CHANNEL DIGITISED AT THE TIME IT WOULD BE TRANSMITTED IN THE STANDARD TELEMETRY FORMAT).

THE DOWNLINK FORMAT IS:

NNNNXYZXYZXYZZCC

WHERE NNNN IS 4-HEX DIGIT SERIAL NUMBER (UP TO 046DH LINES ARE SENT AS DATA IS ACCUMULATED)

XYZ ARE BCD TELEMETRY CHANNEL VALUES AS IN ORDINARY TELEMETRY (VARIABLE NUMBER FROM 1 TO 7)

CC IS 1 BYTE CHECKSUM (ADD NN, NN, 0X, YZ, CC BYTES USING 8-BIT BINARY ADDITION — RESULT SHOULD BE 0AAH).

NNNN=0000 GIVES CHANNEL NUMBER RECORDED IN 0YZ POSITIONS.

THE LINE WITH SERIAL NUMBER 0001 WAS RECORDED AT THE PROGRAM LOAD TIME. NO COMPUTER-READABLE TIMESTAMP IS AVAILABLE, BUT WE WILL ATTEMPT TO GIVE THE PROGRAM LOAD TIME AND TELEMETRY CHANNEL NUMBERS IN FUTURE BULLETINS. DISPLAYING WHOLE-ORBIT DATA IN REAL TIME (OR FROM A TAPE RECORDING) IS AN IDEAL DEMONSTRATION FOR EXHIBITIONS, ETC.

Modifications for OSCAR 11 include a different telemetry period (4.84 secs instead of 5.28 secs, caused by using 2 stop bits per character rather than 3 and the opportunity to insert a timestamp from the real-time clock to indicate when the data was recorded (not yet implemented)!

UoSAT-OSCAR 9 Schedule

The 21 MHz beacon will be in use this weekend.

Friday Load bulletin

Saturday Bulletin/1200 bd telemetry/Digitalker

Sunday Bulletin/1200 bd telemetry/Digitalker

Monday Radiation Data

Tuesday Checksummed telemetry

Wednesday CCD image

Thursday Whole-orbit telemetry data

Friday Load bulletin

General News — QSL Cards

UoSAT-OSCAR 11 QSL cards are being prepared — we hope they will appear sooner than the UO-9 cards and will be coloured! Cards will be backdated for earlier reports!

General News — HF Beacons Enquiry

We have received an enquiry from NASA-HQ concerning the number and distribution of stations receiving the HF Beacons Expt on UoSAT-OSCAR 9. If you haven't returned a questionnaire but actively track the HF beacon(s) or would be interested in a future, higher power experiment, please let us know!

General News — UoSAT Newsletters

The following information has finally been printed at UoS. The full pack will be sent to all enquirers who have written to us since February this year, just ask for individual sheets if you want them!

Newsletter — General status of UoSAT activities at June 1984

Datasheet 1 — UoSAT Project Summary

Datasheet 2 — UoSAT-1 Technical Data Summary

Datasheet 3 — UoSAT-1 Orbit Geometry, Tracking and Groundstation details

Datasheet 4 — UoSAT-1 Telemetry

Datasheet 5 — UoSAT-2 Project Summary

Datasheet 6 — UoSAT-2 Technical Description

Datasheet 7 — UoSAT-2 Reception, Data formats and Telemetry equations

Datasheet 8 — UoSAT-2 FSK demodulation using BBC Micro.

Questionnaire — As transmitted on this bulletin

Further sheets will be issued in the near future. Anticipated subjects include data decoding, experimental suggestions and educational ideas.

Thanks for Reports & Questionnaire Returns

ZL1MO, ON6UG, ZL4KW, W4AUZ, VK4XV, G3UMF, VK4ZF, WA5ZIB, W2RS, KA9Q, HA5WH, G8ISI, OZ1GBY, G8TJZ, VK2ZAZ, VK2WB, VK2ZHM, HB9RKR, VK5AGR, G3HMO, ZL4TIQ, N4HY, I2KBD, K1KSY, KA1FAD, G8UND, G3YMC, IV3TKI, IW3ER, G3VYV, G6YFF, VK2WB, G6TPQ, GM6JVC, ON7VQ, ZL3QL, VK2AVH, ZL1AOX, JA4GVA, G6ESK, G2UK, G4XKR, OZ1WN, G6GWR, I2KBD

N. Clayton (ZL), M. Oslender (ON), B. Lindholm, Milham Ford School

G6ESK, ON4FI, OZ1IWS, G4GPQ, G4PSO, JA2GSD, G3HMO, OZ2LW, I2KBD, D Hudson (Sir William Turner's 6th Form College).

This week: K1KSY, F6EPU, G3FIJ, G3RWL, HB9CBU.

Amateur Satellite Report is published and mailed First Class bi-weekly for the Radio Amateur Satellite Corporation. The purpose is to enhance communications about the Amateur Radio Satellite Program. Subscription rates for the United States, Canada, and Mexico are \$22.00; Foreign is \$30.00. The rate covers 26 issues (typically one year). Send check or money order in U.S. funds (drawn on U.S. banks only please) to "Satellite Report," 221 Long Swamp Road, Wolcott, CT 06716. Information contained herein may be quoted without permission provided credit is given to Amateur Satellite Report, Wolcott, CT 06716. Amateur Satellite Report is Copyright Protected and duplication of this publication in any way including by the photocopy process or by electronic means (computer data banks, etc.) is not permitted under any circumstances. Amateur Satellite Report is endorsed by the ARRL as the special interest newsletter serving the Amateur Radio Satellite Community. The editorial opinions expressed are not necessarily those of the ARRL.